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Indian Standard
SPECIFICATION FOR DIMETHOATE EMULSIFIABLE CONCENTRATES
(Second Revision)

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UDC 632.951 DIMETHOATE

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 3 *November* 1984

Indian Standard

SPECIFICATION FOR DIMETHOATE EMULSIFIABLE CONCENTRATES

(Second Revision)

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AMENDMENT NO. 1 JULY 1988
TO
IS : 3903 - 1984 SPECIFICATION FOR DIMETHOATE EMULSIFIABLE CONCENTRATES

(Second Revision)

(*Page* 4, *clause* 2.2.5) — Add the following note at the end of the clause :

'NOTE — The material need not be subjected to heat treatment if it has crossed half of its shelf life as ascertained from the date of manufacture and date of expiry declared on the container.'

(AFCDC 6)

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AMENDMENT NO. 2 MAY 1994
TO
IS 3903 : 1984 SPECIFICATION FOR DIMETHOATE EMULSIFIABLE CONCENTRATES

(Second Revision)

(*Page* 4, *clause* **2.2.5**) — Delete.

(*Page* 6, *clause* **4.1**) — Substitute the following for the existing:

'When freshly manufactured material in bulk quantity is offered for inspection, representative samples of the material shall be drawn and tested as prescribed in IS 10627 : 1983 within 90 days of its manufacture. When the material is offered for inspection after 90 days of its manufacture, sampling shall be done as prescribed in IS 10627 : 1983. However, the criteria for conformity of the material when tested, shall be the limits of tolerances, as applicable over the declared nominal value and given under clause **2.3.1** of the standard.'

(*Page* 10 *clause* **A-2.4.1**, *line* 7) — Incorporate the following after the word 'boiling':

'In order to avoid overheating, a thermostatically controlled heating mental shall be used.'

(FAD 1)

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AMENDMENT NO. 3 OCTOBER 1995
TO
IS 3903 : 1984 SPECIFICATION FOR DIMETHOATE EMULSIFIABLE CONCENTRATES

(Second Revision)

(*First cover page, pages* 1 *and* 3, *Foreword and Scope, title*) — Substitute 'Dimethoate EC' *for* 'Dimethoate Emulsifiable Concentrates'.

(*Page* 4, *clause* 2.2.3) — Substitute 'IS 1448 (P : 20) : 1982‡' *for* 'IS : 1448 [P : 20] - 1960‡'.

(*Page* 4, *foot-note with* '‡' *mark*) — Add '(*first revision*)' at the end.

(*Page* 5, *clause* 3.1) — Substitute 'IS : 8190 (Part 2) : 1988†' *for* 'IS : 8190 (Part 2) - 1980†'.

(*Page* 5, *foot-note with* '†' *mark*) — Substitute '(*second revision*)' *for* '(*first revision*)'.

(*Page* 6, *clause* 5.2) — Substitute 'IS 1070 : 1992†' *for* 'IS : 1070 - 1977†'.

(*Page* 6, *foot-note with* '†' *mark*) — Substitute 'Reagent grade water (*third revision*)' for the existing foot-note.

(FAD 1)

Printed at Simco Printing Press, Delhi

Indian Standard

SPECIFICATION FOR DIMETHOATE EMULSIFIABLE CONCENTRATES

(Second Revision)

0. FOREWORD

0.1 This Indian Standard (Second Revision) was adopted by the Indian Standards Institution on 31 July 1984, after the draft finalized by the Pest Control Sectional Committee had been approved by the Agricultural and Food Products Division Council and the Chemical Division Council.

0.2 This standard was first published in 1966 and was revised in 1975. In this revision, various requirements of the standard are being updated.

0.3 Dimethoate emulsifiable concentrates are largely used in the control of pests of agricultural and veterinary importance.

0.4 Dimethoate emulsifiable concentrate is generally formulated to contain 30 percent (*m/m*) of dimethoate.

0.5 In the preparation of this standard due consideration has been given to the provisions of the *Insecticides Act*, 1968 and the Rules framed thereunder. However, this standard is subject to the restrictions imposed under these, wherever applicable.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for dimethoate emulsifiable concentrates.

---

*Rules for rounding off numerical values (*revised*).

2. REQUIREMENTS

2.1 Constituents — The material shall consist of dimethoate, technical, dissolved in suitable solvent(s), together with emulsifying agent(s), and with or without stabilizer(s).

2.1.1 Dimethoate, technical, employed in the manufacture of this material shall conform to IS : 3902-1975*.

2.2 Physical — The material shall comply with the physical requirements specified in **2.2.1** to **2.2.4**.

2.2.1 *Description* — The material shall be a stable homogeneous liquid and shall be free from sediment. Suspended matter shall be negligible. On dilution with water it shall readily form an emulsion, suitable for spray.

NOTE — Though initially, the product may be homogeneous, a slight separation of resinous matter might occur which settles at the bottom, but this does not in any manner affect other characteristics of the material.

2.2.2 *Cold Test* — No turbidity or separation of solid or oily matter or both shall occur when the material is subjected to the cold test at 10°C as prescribed in **13.1** of IS : 6940-1982† or any other lower temperature as agreed to between the purchaser and the vendor. Introduction of a seeding crystal is not necessary for the test.

2.2.3 *Flash Point (Abel)* — When determined by the method prescribed in IS : 1448 [P : 20]-1960‡ the flash point of the material shall be above 24·5°C.

2.2.4 *Emulsion Stability* — Any separation, including creaming at the top and sedimentation at the bottom, of 100 ml of emulsion prepared in standard hard water with 2 ml of concentrate for agriculture use, shall not exceed 2 ml when tested by one of the methods prescribed in **13.3** of IS : 6940-1982†.

2.2.5 *Heat Stability* — After treating in accordance with the method prescribed in **13.4** of IS : 6940-1982† the material shall comply with the requirements of **2.2.1** to **2.2.4** and **2.3.1**.

2.3 Chemical — The material shall comply with the chemical requirements specified in **2.3.1** and **2.3.2**.

---

*Specification for dimethoate, technical (*first revision*).

†Methods of test for pesticides and their formulations (*first revision*).

‡Methods of test for petroleum and its products, [P : 20] Flash point by Abel apparatus.

2.3.1 *Dimethoate Content* — When determined by the method prescribed in Appendix A, the observed dimethoate content, percent (*m/m*) of any of the samples shall not differ from the declared nominal value by more than the tolerance limits indicated below:

Nominal Value, Percent	*Tolerance Limit, Percent*	
Up to 9	+ 10 − 5	of the nominal value
Above 9 and below 50	± 5	
50 and above	+ 5 − 3	

2.3.1.1 The actual value of dimethoate content shall be calculated to the second decimal place and then rounded off to the first decimal place before applying the tolerances stipulated in **2.3.1**.

2.3.1.2 The average content of all the samples taken shall not be less than declared nominal value.

2.3.2 *Acidity* — When tested by the method prescribed in **11.3** of IS : 6940-1982*, acidity (as H_2SO_4) shall be not more than 1·0 percent by mass.

3. PACKING AND MARKING

3.1 Packing — The material shall be packed according to the requirements given in IS : 8190 (Part 2)-1980†.

3.2 Marking — The containers shall be securely closed and shall bear legibly and indelibly the following information in addition to any other information as is necessary under the *Insecticides Act* and Rules:

a) Name of the material;

b) Name of the manufacturer;

c) Date of manufacture;

d) Batch number;

e) Net mass of contents;

f) Nominal dimethoate content, percent (*m/m*); and

g) The minimum cautionary notice worded as in the *Insecticides Act* and Rules.

---

*Methods of test for pesticides and their formulations (*first revision*).
†Requirements for packing of pesticides: Part 2 Liquid pesticides (*first revision*).

3.2.1 The product may also be marked with Standard Mark.

3.2.2 The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufactures or producers may be obtained from the Bureau of Indian Standards.

4. SAMPLING

4.1 Representative samples of the material shall be drawn according to the method prescribed in IS : 10627-1983*.

5. TESTS

5.1 Tests shall be carried out by the appropriate methods referred to in **2.2.2** to **2.2.5**, **2.3.1** and **2.3.2**.

5.2 Quality of Reagents — Unless specified otherwise, pure chemicals and distilled water (*see* IS : 1070-1977†) shall be employed in tests.

NOTE — ' Pure chemicals ' shall mean chemicals that do not contain impurities which affect the results of analysis.

APPENDIX A

(*Clause* 2.3.1)

DETERMINATION OF DIMETHOATE CONTENT

A-0. GENERAL

A-0.1 For the determination of dimethoate content, two methods have been prescribed. The Infra-red Spectrophotometric method shall be referee method in case of dispute.

A-1. INFRA-RED SPECTROPHOTOMETRIC METHOD

A-1.1 Principle — The sample is dissolved in carbon disulphide. The absorbance of the extract is compared to that of the absorbance of an extract of a standard by infra-red spectrophotometer.

---

*Methods for sampling of pesticidal formulations.

†Specification for water for general laboratory use (*second revision*).

A-1.2 Apparatus

A-1.2.1 *Infra-red Spectrophotometer* — Capable of reading in the region of **9.1** to **11.2** micron, with the slit width, gain and response time and scanning speed adjustment to produce satisfactory signal-to-noise ratio and adequate resolution under the conditions of the test.

A-1.2.2 *Absorption Cells* — Sealed cesium iodide absorption cells, having internal light path of about 0·1 mm.

A-1.2.3 *Hypodermic Syringe* — 5-ml and 2-ml capacity.

A-1.3 Reagents

A-1.3.1 *Dimethoate* — Standard of known, plus 99, purity.

A-1.3.2 *Carbon Disulphide* — Analytical grade reagent.

A-1.4 Procedure

A-1.4.1 *Calibration*

A-1.4.1.1 Weigh accurately a quantity of standard dimethoate to give a 10 mg per ml solution with carbon disulphide in a suitable volumetric flask.

A-1.4.1.2 Fill the absorption cell with carbon disulphide. Adjust the spectrophotometer for the optimum instrument setting with respect to gain, slit width, response, speed and drum drive. Make scan with carbon disulphide in the cell over the wavelength region 9·1 to 11·2 micron.

A-1.4.1.3 Turn the wavelength scale back to its original setting. Fill the cell with solution (*see* **A-1.4.1.1**). Make a scan in the wavelength region of 9·1 to 11·2 microns, with the same setting as previously used (*see* **A-1.4.1.2**).

A-1.4.1.4 With the base line drawn from 9·1 to 11·2 microns, measure the absorbance of the solution at 9·8 micron.

A-1.4.2 *Estimation of Active Ingredient in the Material* — Weigh accurately a quantity of sample to give a 10 mg per ml solution of active ingredient with carbon disulphide in a suitable volumetric flask.

A-1.4.2.1 Make a scan of carbon disulphide and the carbon disulphide solution of the material (*see* **A-1.4.2**) as prescribed under **A-1.4.1.2** and **A-1.4.1.3** using the same cell and setting. Measure the absorbance as prescribed in **A-1.4.1.4**.

A-1.5 Calculation

$$\text{Dimethoate content, percent by mass} = \frac{A}{A_1} \times \frac{M}{M_1} \times P$$

where

A = absorbance of the sample solution (*see* **A-1.4.2.1**);

M = mass, in g, of standard dimethoate taken for the test (*see* **A-1.4.1.1**);

P = purity of standard dimethoate;

A_1 = absorbance of the standard solution (*see* **A-1.4.1.4**); and

M_1 = mass, in g, of the sample taken for the test (*see* **A-1.4.2**).

A-2. ALKALINE HYDROLYSIS METHOD

A-2.1 Principle — The procedure is based on the alkaline hydrolysis of dimethoate to form volatile methylamine which is collected and determined quantitatively by titrating with standard acid.

A-2.2 Apparatus — An assembly of the apparatus is illustrated in Fig. 1. Minor modifications in the illustrative assembly with regard to joints might be made. However, it should be ensured that all joints are leak-proof.

A-2.3 Reagents

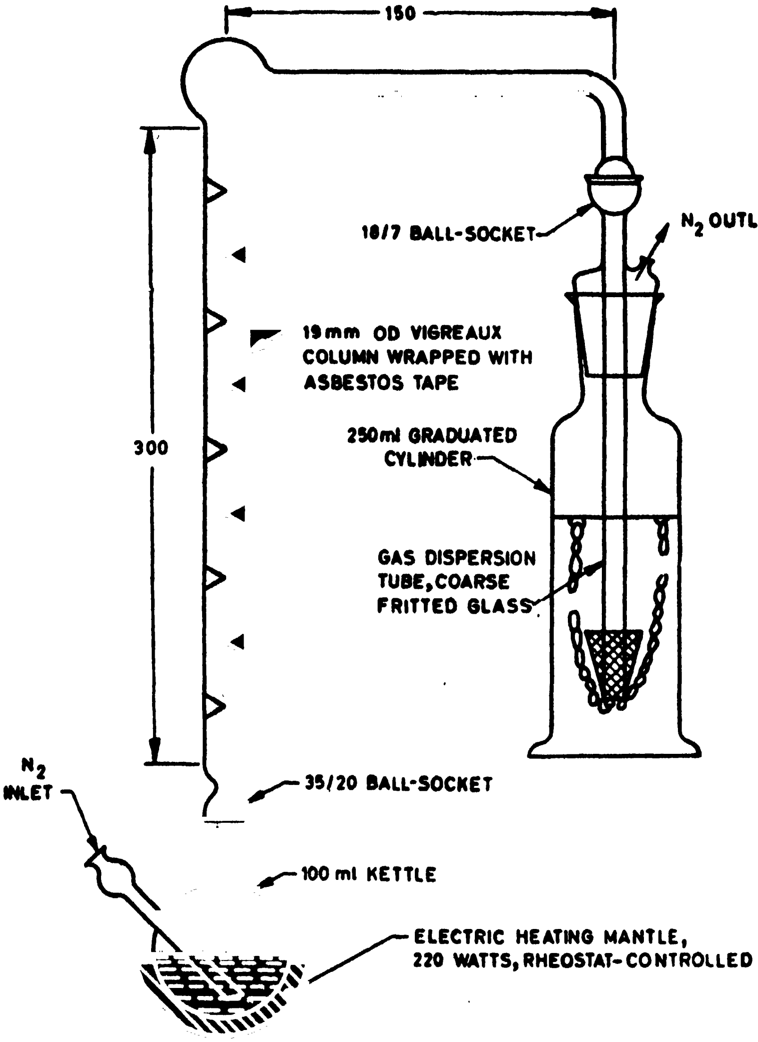
A-2.3.1 *Potassium Hydroxide Solution* — 1·0 N solution in diethylene glycol.

A-2.3.2 *Boric Acid Solution* — Dissolve 20 g of boric acid in distilled water and dilute to 1 litre. Heat at 70°C, swirl and cool to room temperature. Add 10 ml of 0·1 percent bromocresol green indicator and neutralize to a green end point with 0·1 N hydrochloric acid.

A-2.3.3 *Standard Hydrochloric Acid Solution* — 0·1 N, standardized with sodium carbonate previously dried at 260 to 270°C for 30 minutes.

A-2.4 Procedure

A-2.4.1 Introduce, into the kettle, a quantity of sample equivalent to about 0·4 g of dimethoate, accurately weighed. Introduce about 4 to 5 mg of hydrated copper sulphate into the kettle, by means of a graduated cylinder. Add 50 ml of the potassium hydroxide solution to the kettle and add a few glass beads to ensure smooth ebullition. Apply silicone grease to the joint and connect the kettle and condenser using a clamp. Before start of boiling ensure that the joints are secured against leakages. Check for leakages during the experiment with *p*H paper.


150
300
18/7 BALL-SOCKET
N_2 OUTLET
19 mm OD VIGREAUX COLUMN WRAPPED WITH ASBESTOS TAPE
250 ml GRADUATED CYLINDER
GAS DISPERSION TUBE, COARSE FRITTED GLASS
N_2 INLET
35/20 BALL-SOCKET
100 ml KETTLE
ELECTRIC HEATING MANTLE, 220 WATTS, RHEOSTAT-CONTROLLED

All dimensions in millimetres.

FIG. 1 APPARATUS FOR DETERMINATION OF DIMETHOATE CONTENT (ALKALINE HYDROLYSIS METHOD)

Methylamine is alkaline in nature and as such its leakage can be easily detected with *p*H paper 7 to 8·5 range. By means of a graduated cylinder add to the receiver 150 ml of the boric acid solution. Clamp the nitrogen inlet tube securely to the glass inlet tube on the flask and start the nitrogen flow so as to get slow and uniform bubbling in the receiver containing boric acid. Apply sufficient heat to the kettle so that the contents start boiling. Continue boiling for 90 minutes. Stop heating while continuing to pass nitrogen for next 5 minutes.

NOTE — Heating of the kettle should be controlled so that proper refluxing is effected. Carry over of condensate to the receiver, which may result from vigorous distillation may give higher results to the extent of about one percent. So precaution should always be taken to avoid such carry over. Low heating rate results in low results for dimethoate and further heating than 90 minutes does not help.

A-2.4.2 Disconnect the receiver first and then nitrogen supply. Transfer the contents of the receiver into a 500-ml Erlenmeyer flask. Rinse the inside and outside of the gas delivery tube and the inside of the receiver with boric acid solution adding the washings to the Erlenmeyer flask.

A-2.4.3 Titrate the contents of the Erlenmeyer flask with the standard hydrochloric acid solution to the original green colour of the boric acid solution. The end point is best determined by comparing the colour to that of a blank solution of the boric acid and bromocresol green.

A-2.5 Calculation

$$\text{Dimethoate content, percent by mass} = \frac{22{\cdot}93 \times V \times N}{M}$$

where

V = volume, in ml, of standard hydrochloric acid solution used;

N = normality of standard hydrochloric acid solution; and

M = mass, in g, of sample taken for test.

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